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► AGRICULTURAL
AND FOOD
PROCESSING
SECTOR



Investment Opportunities



Alberta
AGRICULTURE, FOOD AND
RURAL DEVELOPMENT

JUL 28 1995



ALBERTA
MINISTER OF AGRICULTURE, FOOD AND RURAL DEVELOPMENT

MLA Grande Prairie - Smoky

Message from the Minister

Alberta offers prospective investors an excellent opportunity to participate in one of the most dynamic sectors of our provincial economy – our agricultural and food processing industry.

Investors in this exciting industry will enjoy favorable investment conditions unique to our province. A competitive environment, low-cost energy, an abundance of high-quality materials, and a well educated, highly skilled and industrious labor force are just a few of the benefits Alberta has to offer. Alberta also has the lowest tax regime in all of Canada including the lowest provincial personal income tax rates, no provincial payroll and capital taxes, and no provincial sales tax. The province itself is strategically located to supply the rapidly expanding markets in the United States Pacific Northwest and in the Pacific Rim nations. The North American Free Trade Agreement (NAFTA) with the U.S. and Mexico represents an additional advantage to the potential investor.

Those seeking to explore opportunities in our province will find that Alberta Agriculture, Food and Rural Development is ready to help. We can offer business and technical support, world class research and process development facilities, and sound market analysis.

We hope this Investment Opportunities booklet will encourage you to look to Alberta as the place to invest in a progressive, world-class agricultural and food processing industry.

A handwritten signature in black ink that reads "Walter Paszkowski".

Walter Paszkowski
Minister



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The Alberta Advantage

Alberta's economy is strong, and one of the fastest growing in Canada. Primary agricultural production, along with its secondary manufacturing industries, contributes \$10 billion to this economy each year. Of the secondary manufacturing industries, the food and beverage industry is now the largest of Alberta's manufacturing sectors, with shipments worth over \$5 billion.

Why have nine of the 50 top world food processors and 11 of the 50 top American food companies located in Alberta? Because investors in the growing agriculture and food processing industry enjoy favorable investment conditions unique in Canada.

What are the benefits to investors? Abundant and high-quality raw materials, low energy costs, a well-educated, highly skilled and industrious labor force and a desirable location. Alberta sits poised to deliver its goods inexpensively to Western Canada and the rapidly expanding markets of west and northwestern United States, Mexico, and the coastal ports that serve Pacific Rim countries. When investors choose to do business in Alberta, they will be

competing in a healthy, market-driven economy.

Location

Consider the key advantages of Alberta's location. Major food retailers and distributors have centralized their western Canadian buying and distributing operations in Alberta. The heart of the western Canadian marketplace (British Columbia to Manitoba) of 7.5 million people, Alberta also provides the main arterial connections to reach 50 million more consumers in the western and mid-western United States. Market potential is even further enhanced now that liberalized trade agreements offer secure and greater access to United States and Mexican markets.

Cost-effective road, rail and air routes link Alberta with markets across Canada and throughout North America, Asia and Europe. The Pacific Rim is easily accessible through an excellent intermodal system linking Alberta to the port of Vancouver. As well, Edmonton and Calgary's status as container ports offer them ready access to international markets.

Transportation costs in Alberta are extremely reasonable.

Alberta has the lowest trucking costs in Western Canada and the United States, as well as favorable backhaul rates to United States markets. Furthermore, there is room to expand both freight and passenger transportation, with very little threat of routes becoming over-congested.

Resources

Consider Alberta's resources. The province is renowned for its abundant natural resources, highly-skilled population and desirable business environment.

Agricultural Resources

Our impressive agricultural land base of 50 million acres is currently used for grain, oilseed, vegetable and livestock production. With slightly more than 30 per cent of Canada's total farm area, Alberta produces about one-quarter of Canada's wheat (7.8 million tonnes), one-third of all forage crops (7.4 million tonnes), more than 40 per cent of the nation's Canola (2.1 million tonnes) and close to half its barley (6.5 million tonnes). Alberta also produces nearly half of the country's beef and veal (1.5 million head per year), along with a third of its lamb and mutton (80,000 head per year),

and 10 per cent of its pork (2.2 million head per year). This resource base provides agricultural processors and manufacturers with a reliable supply of competitively priced raw materials.

Human Resources

The work ethic is strong in Alberta and the labor climate is stable. Alberta's population of more than two and a half million supports 34 post-secondary institutions in the province. Consequently, Alberta boasts one of the world's most productive and best-educated work forces. Young and highly-motivated, the province's labor force of 1.9 million is also the country's fourth-largest.

Alberta's labor force has:

- the highest participation rate in Canada
- the highest percentage of workers with post-secondary education
- a labor environment where productivity and quality workmanship are traditions in industry
- the lowest percentage of unionized workers in Canada
- stability

Business Environment

Taxes

Business comes first in Alberta. Alberta's corporate tax system encourages investment, and government policies stimulate the local processing of resources.

Business and individuals alike benefit from Alberta's taxation rates – the lowest overall taxes in Canada.

Alberta has:

- the lowest corporate and personal taxation in Canada
- no provincial sales tax (the only province in Canada without one)
- no general capital or payroll tax
- the lowest gasoline taxes in Canada

Energy

Alberta's abundance of low sulphur coal and natural gas guarantees reliable energy supplies, thus providing the business community with a competitive advantage.

Alberta has:

- the lowest energy (natural gas and electricity) costs in Canada (natural gas is less expensive here than anywhere in North America)

Communications

Alberta's sophisticated telecommunications infrastructure offers:

- extensive telecommunications capabilities and services
- the lowest telephone charges in Canada

Investment Opportunities in Alberta

Alberta offers prospective investors an excellent opportunity to participate in a dynamic sector of the provincial economy – the agricultural and food processing industry. In large part due to the success of Alberta's food and beverage industry, the pace of the agricultural and food processing industry's exceptional growth is expected to accelerate at least until the year 2000.

Alberta's tradition of efficient agricultural production has provided a solid base for the industry expansion responsible for today's success. This tradition continues to spur tomorrow's growth.

This publication identifies just some of the investment opportunities available in the agricultural and food processing industry. Product categories described here are those which maximize use of Alberta's raw materials and other advantages. The brief descriptions are intended to give you a snapshot view only. If you are interested in exploring some of the many other potential processing opportunities in Alberta, please contact:

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Processing Industry Division
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We hope *Investment Opportunities* encourages you to investigate Alberta as a profitable place to invest.

Investment Opportunities in Alberta

Alberta's investment opportunities are vast and diverse. The province's rich natural resources, including oil, gas, and coal, provide a strong foundation for economic growth. Additionally, Alberta's skilled workforce and advanced infrastructure make it an attractive location for a wide range of industries.

One of the key investment opportunities in Alberta is in the energy sector. The province's abundant reserves of oil, gas, and coal offer significant potential for exploration and production. Furthermore, Alberta's leadership in renewable energy, particularly in wind and solar power, presents exciting opportunities for investment in clean energy technologies.

Another major area of investment is in the manufacturing and technology sectors. Alberta's strong industrial base and highly educated workforce make it an ideal environment for manufacturing operations. Moreover, the province's growing tech industry, centered around innovation hubs like Calgary and Edmonton, offers promising prospects for investment in software development, artificial intelligence, and other cutting-edge technologies.

For those seeking investment opportunities in the agricultural sector, Alberta's fertile land and advanced farming techniques provide a solid foundation for success. The province's diverse agricultural products, including grains, oilseeds, and livestock, offer a wide range of investment options for both large-scale operations and smaller-scale ventures.

Finally, Alberta's strategic location and excellent infrastructure make it a prime location for investment in logistics and transportation. The province's extensive network of roads, railways, and airports facilitates efficient movement of goods and services, creating a highly competitive environment for businesses in these sectors.

In conclusion, Alberta offers a wealth of investment opportunities across a variety of industries. From energy and manufacturing to technology and agriculture, the province's diverse economic landscape provides a wide range of options for investors seeking growth and profitability. With its rich resources, skilled workforce, and advanced infrastructure, Alberta remains a top choice for businesses looking to expand their operations in North America.

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Assistance

Alberta, the province with the highest per capita retail spending in Canada, has a modern business infrastructure and the resources needed to initiate new enterprises. To encourage private sector innovation, the Government of Alberta has developed a range of business programs, promoted trade and investment, and acted as a catalyst for venture capital pools. Marketing, counselling, export development and other support programs are available to agri-businesses and to processing enterprises.

Alberta's economy has enjoyed an expansion over the last two decades that continues at a steady pace. The Government of Alberta welcomes you to explore the numerous investment opportunities available in this exciting time for the agricultural and food processing industry.

For more information about any of the government agencies listed below, please contact the Industry Development Branch, Alberta Agriculture, Food and Rural Development:

Lou Normand, Branch Head
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Processing Industry Division
Alberta Agriculture, Food and

Rural Development
304, J. G. O'Donoghue Building
7000 - 113 Street
Edmonton, Alberta, Canada
T6H 5T6
phone: 427-7366 fax: 422-3655

Alberta Agriculture, Food and Rural Development

If you're interested in pursuing an agribusiness opportunity here, Alberta Agriculture, Food and Rural Development is ready to help. Its Industry Development Branch can provide detailed information, along with production and marketing expertise related to opportunities suggested here, or any others you may be considering.

Industry Development Branch

The Industry Development Branch assists companies considering investment or expansion in Alberta. Assistance is provided in the form of information and technical services and financial assistance in support of a range of development projects.

The Branch:

- provides information on investment opportunities to firms interested in expanding their operations or establishing new processing facilities
- supports developmental projects designed to increase technological awareness, develop products and processes
- provides assistance for feasibility studies

- provides market and equipment evaluation
- advises companies regarding packaging and promotional material development
- helps with business planning
- in co-operation with the Food Processing Development Centre, helps transfer new technology and addresses issues related to process and production methods and systems

Contact the branch for information about financial and technical assistance, the province's research and process development facilities, and sound market analysis.

Food Processing Development Centre

The Food Processing Development Centre was opened in 1984 to encourage expansion of Alberta's food and beverage industry. The Centre is a modern, fully-equipped facility with a pilot plant and product development laboratory staffed with experienced food scientists, engineers and technologists. It is one of the few public facilities of its type in North America.

Major areas of support and service include:

- concept development and analysis
- prototype design and demonstration
- product optimization
- finished product testing
- product packaging
- regulatory requirements and labelling assistance
- quality control and assurance specifications

An extensive test kitchen allows staff to simulate consumer, food service and institutional food preparation methods. Similarly, pilot plant staff can simulate industrial production to assess and evaluate product or process performance. Private companies in the industry are also invited to use the pilot plant for limited production on an interim basis.

Pilot plant services are available to:

- food processors
- entrepreneurs
- industrial or commodity groups
- university researchers
- federal or provincial agriculture personnel
- suppliers of equipment, ingredients and packaging

Clients also have access to international technologies in product and process developments through in-house library services and a computerized information search and retrieval system.

The Centre's facilities and expertise are available on a contractual basis to clients, and computer information retrieval is available on a modest fee for service basis.

Food Quality Branch

The Food Quality Branch provides analytical and information services to help ensure the quality, safety and nutritional value of Alberta's food products.

At its Edmonton laboratory, the branch provides food processors:

- microbiological and chemical analysis and related information services
- assistance in developing quality assurance and testing programs
- assistance in designing and implementing Hazard Analysis Critical Control Point (HACCP) programs.

Alberta Financial Services Corporation (AFSC)

AFSC offers unique programs to help agriculture and food processing companies achieve their business goals. For example, the Agribusiness Loan Program stabilizes and encourages growth of agri-food processing companies. The program provides financial services to companies developing products and markets that will diversify the agricultural economy.

Alberta Agriculture Research Institute (AARI)

AARI is a provincial crown corporation that promotes, co-ordinates, prioritizes and supports agricultural research. The institute also communicates research results to appropriate industry sectors. The food processing industry benefits particularly from AARI's Matching Grants and Research Co-ordination programs.

Alberta: A Great Place to do Business

The prosperity Alberta enjoys today stems from the provincial government's unswerving commitment to the free enterprise system. The province has tackled the thorny issues of deficit and debt and the economy has rebounded in return. Optimism runs high in the business community; investment in the province increases steadily.

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The Government of Alberta, through Alberta Economic Development and Tourism, and Alberta Agriculture, Food and Rural Development, works closely with companies and individuals interested in investing in Alberta's agricultural processing industry. Alberta welcomes and encourages foreign investment.

Alberta offers a healthy environment for your company to grow in. Many have discovered the benefits of investing in Alberta's agricultural processing industry. If you'd like to explore your potential here, the Government of Alberta is ready to help.

Bakery Products: Frozen Bake-off

Frozen bake-off products – unbaked, baked or frozen dough products – are convenient to use and quality consistent. They come in the form of breads, cakes, pastries, muffin and cookie batters, among others. Packaged either in bulk or individually, they can supply both wholesale and retail outlets.

Market Situation and Trends

At present, Western Canada supports a \$325 million bakery industry.

Reflecting the growth of this industry, almost half of Canada's 2,280 major retail in-store bakeries have been built in the last eight years. In the United States and Eastern Canada, most of these bakeries' products are bake-off. As Western Canada mirrors this trend, bake-off manufacturing opportunities will increase here.

Consumer demand for a greater variety of baked goods also creates new production opportunities. Small in-store bakeries, hotels, restaurants and institutions (HRI) can't meet these demands, as they have limited expertise and production capacity. Indeed, the HRI industry itself is a market

for frozen bake-off products as almost all desserts sold in restaurants, for example, are prepared off-premises, with some processors supplying products for this market only.

Finally, markets will expand as new technologies to extend product shelf-life continue to be developed.

Market Potential

Frozen cookie and other doughs are the first frozen bake-off products to be sold at the retail level. Sales are growing quickly and steadily.

The Investment Opportunity

The wholesale manufacture of frozen bake-off products.

Why choose Alberta?

- There's no major wholesale manufacturer of frozen bake-off products in Alberta; items are currently imported.
- Alberta produces all the major raw materials needed to manufacture frozen bake-off products, including high-quality milling wheat, Canola oil and sugar.

Capital Requirements

Small-scale

- a production facility serving local markets
\$0.5 - \$2 million
- a full-range product manufacturing plant serving regional markets
\$1 million (minimum)

Large-scale

- an automated plant, capable of serving the markets of western North America
\$5 million (minimum)

Starch and Gluten

Both starch and gluten are produced from wheat; starch alone is produced from barley.

Two-thirds to three-quarters of the starch produced is used in industrial applications, while the remainder is used by the food and pharmaceutical industries. The pulp and paper, oil and livestock feed industries depend on its production.

Using today's technology, approximately one tonne of wheat starch can be extracted from wheat grown on one acre of land.

Market Situation and Trends

Canada exports 75 per cent of its wheat gluten, mostly to the United States.

In Europe, wheat starch processing has grown three-fold within a decade.

Market Potential

State-of-the-art wheat starch production technology is now available from a number of consulting and operating companies in the western world. New barley starch production technology (fractionation) was developed in Finland where a large plant successfully processes

starch from 450 tonnes of barley a day.

A recent study predicts the consumption of starch in western Canadian and United States markets will increase at an average rate of 24 per cent until 1995, and 13 per cent until 2000. In Alberta, extensive new pulp and paper mill construction bears out this prediction, and the demand for starch within the province is expected to increase significantly. Alberta processors can easily access markets in Ontario and United States where paper makers need a constant supply of starch for production.

The Investment Opportunity

Manufacture of wheat starch and gluten, and barley starch.

Why choose Alberta?

- Alberta has readily available raw materials: Alberta produces 49 per cent of Canada's barley and 28 per cent of its wheat
- Alberta is close to the large paper and paperboard markets of British Columbia and the Pacific Northwest.

Capital Requirements

Barley plant

- using 300 tonnes per day to produce 45,000 tonnes of feed and 35,000 tonnes of starch – with a provincially licensed, environmentally acceptable effluent treatment plant:

\$60 million

Wheat starch and gluten plant

- using 200 tonnes per day to produce a comparable amount of starch – with a provincially licensed, environmentally acceptable effluent treatment plant:

\$45 million

Confectionery

Confectionery products include candies, chocolates, chocolate bars and chewing gum. Canadians consume over 17 pounds of candy per person a year, compared to Americans at 20 pounds.

Market Situation and Trends

In 1993, Canadian domestic manufacturing shipments of sugar and chocolate confectionery were \$1 billion, up six per cent from the previous year. Of these, chocolate items accounted for two-thirds of the market. Chocolate bars alone accounted for almost half the total sales. Today, the big multi-national companies still dominate the candy market, producing items for volume sales. However, premium quality gourmet products, particularly chocolate, are leading market growth in the confectionery industry.

Sugar-free confectionery is a growing market. As most consumers are concerned about fat and sugar in their diets, they will continue to buy more varieties of sugar-free candies and treats.

Market Potential

Niche markets exist for:

- premium quality confectionery products
- chocolates for the gourmet market
- low fat and/or sugar products
- products designed for special or holiday occasions

The Investment Opportunity

To establish a small facility designed to produce confectionery items for niche markets.

Why choose Alberta?

- No large-scale confectionery manufacturers operate in the province.
- Little competition exists in locally made specialty items such as gourmet chocolates and truffles.
- Alberta companies successfully export specialty candy products across Canada and the United States.
- The Food Processing Development Centre helps with new product development.

Capital Requirements

Small-scale

- entry cost, including equipment, of a store-front operation based on manual labor, designed to serve a small local market:
\$250,000

Large-scale

- automated, to serve markets of western North America:
\$1 million (minimum)

Cookies and Crackers

Market Situation and Trends

Western Canada's share of the country's cookie and cracker sales is 30 per cent. Cookies sales have always been price-driven and are about three times as large as cracker sales.

The cookie and cracker industry is very competitive. Existing companies protect or increase market share by introducing new products designed to respond to consumer trends. Therefore, the successful company has sufficient resources to continually develop, promote and distribute new products, as well as maintain efficient and cost-effective production.

Market Potential

As less baking is done in the home, more cookies and crackers are sold packaged on store shelves. Therefore, a steady growth is expected for this business over the next five years. At present, each Canadian eats about eight pounds of cookies and three and a half pounds of crackers a year.

Dietary concerns relating to fibre, fat and sugar have created a demand for specialty cookies and crackers.

The Investment Opportunity

Introduction of a line of quality, innovative cookie and/or cracker products.

Why choose Alberta?

- Exceptional raw materials – cereals, flours, sugar and edible oils – are readily available.
- Alberta has an efficient transportation infrastructure.
- The Food Processing Development Centre can help develop specialty cookies and crackers.

Capital Requirements

Small-scale

- to open a store-front, specialty bakery to serve the local market population

\$400,000

Large-scale

- to build a cracker plant to supply the national market

\$10 million

Pasta

Pasta's popularity has surged across North America. No longer considered solely an ethnic food, pasta graces the tables of gourmet, contemporary cuisine, natural food and vegetarian restaurants throughout the continent. In the United States, pasta is now the second most popular entree offered on restaurant menus, a trend reflected by Canadian restaurants, with twice as many serving pasta as did 10 years ago.

Market Situation and Trends

Markets for pasta – dry, fresh and frozen – show steady, solid growth. Dry pasta sales dominate the market. In the last 10 years, Canadians have increased their per capita consumption of pasta by 25 per cent. We still don't eat as much as the Americans, who consume 19 pounds each a year, compared to our 13 pounds. However, both countries lag far behind the Italians who annually enjoy 100 pounds of pasta per person.

Consumers like pasta because it's inexpensive, tasty, nutritious, and simple and quick to prepare. The more adventurous buy pastas in intriguing shapes, sizes, and colors, while those with special dietary needs try

pastas made from grains such as rice, corn, spelt or kamut, as well as durum wheat.

Market Potential

- Food service sales of pasta are growing faster than retail sales.
- Fresh pasta sales, currently 1.5 per cent of total sales, are growing at 16 - 20 per cent annually.
- Instant, microwaveable pasta is new on the market.
- Organic pastas, also new products, represent a \$12 - \$15 million market.

Product development

- Low calorie pasta is being researched.

The Investment Opportunity

The manufacture of pasta, both specialty and regular varieties.

Why choose Alberta?

- Alberta grows large volumes of superior quality grains, including the best durum wheat in the world.
- Alberta is the market centre for Western Canada.
- Freight costs to the western United States markets are low.

Capital Requirements

Small-scale

- to set up a small fresh pasta facility:

\$300,000

- if federally inspected and equipped with modified atmosphere packaging (MAP) equipment, costs increase to:

\$1.5 million

Large-scale

- to set up a two-line (for short and long goods) production plant, capable of producing approximately 20,000 tonnes of pasta a year:

\$10 million

Malt Extract

Malt extract is the by-product of malt, a grain (usually barley), partially germinated, dried and cured. The extract is made by liquifying the malt and concentrating the liquid into the form of a syrup which is then packaged for use as a food and also as a cottage brewing ingredient. Producing malt extract involves many of the operations of a brew-house.

Capital Requirements

A malt extract plant is single purpose. Ideally, it should be close to a malting operation to minimize shipping costs.

- to build and equip:
\$5 - \$10 million

Market Situation and Trends

Currently, there are no producers or suppliers of malt extract in Canada. Therefore, malt extract is imported from the United States or the United Kingdom. In 1993, the value of malt imports into Canada was \$32.1 million.

The Investment Opportunity

To establish a malt extract production plant.

Why choose Alberta?

- Alberta is the centre of malt production in Canada; two major malting plants produce over 200,000 tonnes of malt annually.
- Alberta has an abundance of good quality malting barley, sources of good water and inexpensive natural gas.

Pea Products

Peas are a good source of starch, fibre, protein (particularly lysine), carbohydrate, iron, vitamins and minerals.

Uses

- primary processing: for animal feeds – replacing soy meal
- secondary processing: into starch, protein and fibre, for high-value products
- in foods – as ingredients for soups, salsa, chips and baked goods; as a meat or milk extender; or as fibre to enrich foods, particularly those prepared in institutions
- in industrial applications – in paper products, charcoal briquettes, potash de-sliming, carbonless paper, cardboard boxes, pet foods

Market Situation and Trends

Although Alberta grows almost one-third of Canada's one million metric tons of peas, less than five per cent of Canada's production is processed. Most is exported as raw material.

Market Potential Domestic

The domestic market for peas is undeveloped. Today, for example, many animal feed ingredients are imported. As research shows that peas can be

successfully mixed with other ingredients to produce high-quality animal feed, manufacturers can substitute nutritious, readily-available pea meal for the lysine-deficient soybean meal that is currently imported for hog feed. The hog market, expected to experience tremendous growth by 2000, will significantly expand the domestic market for hog feed.

Export

Europe and Asia also provide large markets for animal feed. At present, Asia is the largest importer of feed and is expected to have the highest growth in this area.

The Investment Opportunity

To establish a pea-processing plant.

Why choose Alberta?

- High-yielding and high-quality peas are readily available.
- Alberta excels in pea-processing and production research and development.
- Alberta provides economic access to Asian and European markets.
- Surplus grain elevators could be used as processing facilities.

Capital Requirements

Capital costs depend on the complexity of processing necessary to produce the end product. Each additional step in processing peas – from cleaning, dehulling and splitting, to breaking down into component parts – adds cost.

Snack Foods

Market Situation and Trends

Canada's appetite for snack foods is growing. Potato chips hold the largest share of the market (71 per cent), but corn-based products have made rapid gains as American trends continue to strongly influence Canadians. Tortilla chips show exceptional growth in production and sales, outstripping all other categories of snack food. Pretzels, popcorn and sunflower seeds continue to sell well. Some of the companies producing these products are growing at more than 10 per cent per year.

Market Potential

Alberta grows 20,000 irrigated acres of potatoes and has the potential to increase that acreage significantly, therefore providing a particularly good manufacturing opportunity to tap into the potato chip market. Also, the growing corn and tortilla chip market and its off-shoot products such as dips, salsa and cheese mixes need suppliers.

The health-conscious snack-food consumer provides a niche market opportunity for minimally processed products perceived as nutritionally superior to regular varieties.

Products to suit this consumer sell because they are low-salt, salt, cholesterol or preservative free, or organically grown. Alberta grows all the raw materials necessary to produce familiar snack products, as well as innovative products based on non-traditional ingredients such as beans and peas.

Sweet, shelf-stable snacks are being sold increasingly in convenience stores and vending machines, as well as supermarkets.

The Investment Opportunity

To establish a snack production facility, using local materials, to respond to niche market opportunities.

Why choose Alberta?

- Raw materials are abundant – potato acreage is large and has potential to grow.
- Alberta has an extensive and inexpensive transportation network.
- Alberta is the retail buying and distribution centre for Western Canada.
- The Food Processing Development Centre is available to help companies develop new products.

Capital Requirements

- chip production: depending on capacity and packaging equipment:
\$500,000 to \$1 million

Processed Meats

Market Situation and Trends

The processed meat industry is consumer-driven and must constantly adapt to satisfy a changing market.

Processed meats represent approximately 20 per cent of Canada's total red and white meat per capita consumption. The main ingredients of Alberta's processed meats are pork (65 per cent), beef (20 per cent) and poultry (15 per cent). The industry expects a tremendous increase in pork production by 2000 and therefore a greater supply of pork for processing.

Domestic markets

- Ontario, Quebec, as well as Western Canada

Export markets

Current:

- Western United States is Alberta's primary export market.
- Japan buys mainly beef jerky and frozen-portion, controlled meat products.

Growth:

- Mexico's growing hotel and restaurant trade is a new, high-value market.

Market Potential

New technology that extends the shelf-life of fresh meat is expanding fresh meat sales both nationally and internationally. Sales in the traditional high-volume bacon, luncheon meat and wiener market are expected to grow with the introduction of low fat, low salt, or poultry sausage products.

Shelf-stable meat snacks, such as beef jerky and pepperoni, are rapidly becoming more popular at home and abroad, particularly in Pacific Rim countries.

Specialty items, such as patés, respond to lucrative local and export niche markets. At present, Alberta imports all its meat patés from Quebec and British Columbia.

Although the large volume uses of meat are for main line products made from beef, pork and chicken products, there's a niche market for exotic meats and processed products based on bison, musk-ox and other game animals.

The Investment Opportunity

To establish a meat-processing facility using traditional and exotic local meats to produce

specialty products for domestic and export niche markets.

Why choose Alberta?

- There's a reliable source of raw materials.
- The pork supply is growing.
- Alberta is positioned for effective international distribution.

Capital Requirements

Costs depend on the size of operation and type of production equipment used. If the product is to be sold in Alberta, a provincially approved facility only is necessary. Products for export must be manufactured in a federally inspected and approved facility. General construction costs for such a facility run at \$150 per square foot.

Breaded Products

Market Situation and Trends

As North Americans continue the trend of meal snacking and casual dining, the demand for finger foods increases. Breaded products meet this demand effectively, particularly in the hotel and restaurant industry. As well, these products have high potential for international sales and distribution.

Product Development

There is unlimited scope for increasing the range of breaded products. Developments in breading and battering techniques have improved product quality and versatility. Now, standard ingredients can be used in new ways. For example, technologies used for breading poultry can also be adapted to red meat.

As always, potential investors should keep in mind that the success of new products in the marketplace will be highly influenced by effective marketing.

The Investment Opportunity

To set up a facility to manufacture breaded products and/or crumb coatings.

Why choose Alberta?

- All major ingredients for crumb production are readily available.
- The Food Processing Development Centre is available to help companies develop new products.
- Alberta provides good market distribution.

Capital Requirements

Small-scale

- to build a federally inspected and approved facility:
\$500,000 (minimum)

Adding thermal processing, freezing operations, greater capacity and versatility increases costs accordingly.

Hides and Tanning

Market Situation and Trends

Alberta produces about half of Canada's cattle hides, or 25,000 sheets per week. Production is growing. However, only 12 to 15 per cent of these hides are tanned in Alberta. The one tannery in the province processes these hides directly, without salt curing. The other hides, worth about \$100 million, are fleshed, salt-cured and shipped to Eastern Canada, the United States and offshore markets for further processing into finished leather goods.

Cured hides must have the salt removed before they can be tanned; therefore processing fresh hides is both economically and environmentally advantageous. A tannery established close to southern Alberta's beef processing plants would be able to cure hides directly.

Many of the traditional hide-processing countries have closed their older tanning operations due to environmental concerns. However, technology exists to operate these plants in an environmentally acceptable manner.

Market Potential

As the consumer preference to buy goods made from natural materials continues, market demand for leather products is expected to grow. Also, no synthetic replacement has yet been developed to effectively imitate leather's unique properties. Therefore, particular products like horse saddles and quality shoes will continue to provide a good market for leather manufacturers.

The Investment Opportunity

To locate a tannery close to beef processing plants in Alberta.

Why choose Alberta?

- Alberta provides direct access to raw hides: the province raises and slaughters one and a half million cattle a year – half of Canada's total.
- Many of the raw materials for tanning can be secured locally.
- Alberta has an abundant supply of fresh water.

Capital Requirements

- to build a plant capable of processing 12,000 hides per week, with an environmentally acceptable effluent treatment plant:

\$12 - \$15 million

Pet Foods

Pet foods consist primarily of dog and cat foods, including canned (moist), dry (extruded), semi-moist and specialty treats. Standard pet food products still account for the bulk of sales. Besides maintenance and gourmet foods, manufacturers design lines of health-related pet foods, such as those that are age or allergy-related, low-ash or high-protein.

Market Situation and Trends

Of the \$600 - \$800 million Canadian market, Western Canada's share is 50 per cent. Alberta's share is 10 per cent. The United States pet food market is worth \$8 billion, with marked growth in the western states. At \$1.5 billion, Japan's pet food market is growing very rapidly, a trend followed by other Asian countries.

In North America, pet owners are buying pet foods they believe are nutritious, as well as good value for money. While they used to buy from supermarkets, they now buy more often from veterinarians, pet stores and price clubs, eroding supermarket sales by 20 per cent.

At present, dry pet foods are processed in Alberta by regional plants owned by multi-national

companies, but there is no canned food processor. Although the provincial pet food market alone cannot support such a facility, there are sufficient accessible export markets to make such an operation profitable, especially if the operation included packaging for other processors.

The Investment Opportunity

To establish a pet food processing and packaging facility.

Why choose Alberta?

- Alberta can supply an abundant and varied supply of raw materials such as meat, meat by-products and cereals.

Capital Requirements

To build the smallest economically-viable facility

- canned:
\$9.1 million
- dry:
\$1.6 million

The manufacturer of moist pet foods would need can-forming equipment or a supply arrangement with a local can supplier to avoid the prohibitive cost of transporting empty cans. Alternative packing to the traditional can is being developed.

Costs increase as production capability and product variety increase.

Animal By-Products

Already, Alberta is the centre for meat-slaughtering in Canada, producing 1.5 million beef and 2.4 million hog carcasses a year. Within the next three years, we expect a major expansion of present facilities and therefore a large annual increase in carcasses produced. Slaughter facilities provide a steady supply of animal by-products such as organs, glands and blood. Generally, this material is rendered; however, there are many other profitable uses of these by-products which are considered high-value, speciality items when used in pharmaceutical, diagnostic, analytical, laboratory or research applications.

Animal by-products can be processed into:

- rennet
- natural insulin
- follicle stimulating hormone
- albumin
- bovine haemin

Market Situation and Trends

In pharmaceutical applications particularly, synthetic alternatives are often not as effective as their counterparts produced from natural ingredients, and costs associated with their development are

increasing. This is stimulating demand for animal by-products.

Because international trade in some products of animal origin is restricted, an opportunity exists for Canadian companies to licence foreign technology and process animal by-products locally.

At the moment, Canada does little by-product processing.

The Investment Opportunity

An excellent opportunity exists to establish a core animal by-product processing industry.

Why choose Alberta?

- Raw materials are plentiful. They tend to deteriorate quickly and processing should be done at the source.
- Alberta is a centre for high technology and can provide the highly skilled labor and operational staff necessary for such processing.

Capital Requirements

High-value, animal by-product processing tends to be costly because facilities are dedicated and must conform to rigorous health and safety standards. Purchasing specialized equipment and assuring a clean environment make initial costs high, although the facility itself need not be large. However, the unit price for the processed products is also high, and transportation costs are negligible because these products are used in low volumes.

In most cases, a company undertaking animal by-product processing must have particularly good financial capabilities or be able to obtain cash and financing capital.

Gelatin

Gelatin is processed from animal skins and bones. Its manufacture is a complex, multi-stage process, usually performed at a plant close to the source of raw materials.

Gelatin's properties include the formation of strong, transparent gels and flexible films that are digestible, easily assimilated by the stomach, soluble in hot water and have a positive binding action. These properties give gelatin wide-ranging applications in the food processing, pharmaceutical, photographic and paper industries.

Market Situation and Trends

Food product development departments use gelatin to construct new consumer-oriented products. As more uses are found for gelatin, demand for its production will increase.

The Investment Opportunity

To establish a gelatin manufacturing plant.

Why choose Alberta?

- Raw materials are readily available – 50 per cent of Canada's beef and 15 per cent of its hogs are slaughtered in Alberta – as are the inorganic chemicals

necessary for processing gelatin.

- Power to operate the plant is inexpensive.

Capital Requirements

- to establish a plant capable of processing either animal skins or bones to the finished product:

Several million dollars

Prepared Entrées

Prepared entrées are pre-cooked main course meals that are frozen, refrigerated or chilled. They include ethnic dishes such as Italian, Oriental, Ukrainian, Mexican, East Indian and Jewish, as well as diet-specific, such as low in salt, fat or calories.

Market Situation and Trends

Prepared entrées are changing from meat-based to pasta, rice, potato or bread-based products. In Alberta, most entrées are prepared with meat or pasta; about one-third are ethnic dishes.

Retail markets for prepared entrées are growing as the products find appeal with individual consumers, as well as with restaurants, hotels and institutions. More people stay at work for lunch and more are reheating entrées in the office microwave. In-store delis and institutions find prepared entrées an economical and convenient alternative to preparing the products on their premises.

Canada's frozen entrée sales, worth nearly \$250 million, have been showing consistent annual growth of over 10 per cent. If sales trends are right – that by

the year 2000 consumers will spend only 40 per cent of their food dollars on foods prepared at home – then entrée sales have great market potential.

Market Potential

An Alberta manufacturer, producing fresh entrées, could supply Western Canadian and Pacific northwestern markets, and avoid competition with multi-national companies.

Markets generally respond favorably to prepared frozen and fresh entrées made from the fresh, wholesome and high quality materials available in Alberta.

The Investment Opportunity

To establish a plant that manufactures a variety of prepared entrées.

Why choose Alberta?

- A wide variety of raw materials is available.
- Alberta has an extensive and inexpensive transportation network.
- Alberta is the retail buying and distribution centre for Western Canada.
- The Food Processing Development Centre is available to help companies develop new products.

Cost Requirements

Small-scale

- To start up a small, manually operated plant:
\$250,000 - \$500,000

Large-scale

- To establish an automated facility, with full-scale refrigeration, larger warehousing, extensive product range, computer-integrated manufacturing, capable of serving the North American market:
\$10 - \$15 million

Home-style Pies

Market Situation and Trends

Consumption of fresh, home-style pies is increasing. Many consumers consider pie a healthy dessert with few non-natural ingredients, but they also enjoy it for nostalgic reasons. However, pies are less often made at home because their preparation is time and labor consuming. Restaurants have responded to this trend by increasing the variety of pies they offer or by specializing in pies only.

Market Potential

The success enjoyed by other dessert items, such as cheesecake, indicates a potential niche market for fresh baked and unbaked pies. Fresh, high-quality, home-style pies, in individual as well as the larger nine and eleven-inch sizes, are in demand. This new market calls for restaurant-type operations to produce and distribute fresh and frozen fruit pies and cream pies, for both in-house and take-out sales.

Alberta producers can provide many ingredients for pies, such as shortenings, flours, vegetable oils, sugar and honey. Also, the province's young, growing berry industry is capable of supplying some fresh fruit, such as

Saskatoons, strawberries, blueberries and raspberries. A pie-manufacturing operation must be able to produce a good variety of pie types and sizes.

The Investment Opportunity

To start a pie-manufacturing facility.

Why choose Alberta?

- Ingredients are readily available.
- There's little competition.
- Distribution centres are located in Calgary.

Capital Requirements

Small-scale

- to equip a manually operated facility:

\$75,000

Full-scale

- to equip an automated facility, producing 90 large pies a minute:

\$500,000

Ready-to-Eat Breakfast Cereals

Market Situation and Trends

Canadians spend about \$1.5 billion annually on breakfast foods and beverages, of which almost half represents cold cereal sales. Alberta represents one-third of Western Canada's cold cereal market of over \$200 million a year and has the highest provincial growth rate in both value and volume.

Although cold cereals are one of the most competitive categories in the breakfast food sector, studies show that ready-to-eat cereal is the top growth category out of 569 grocery categories. Most households buy these cereals.

New cereals are usually fibre-based, low in fat and nutritious. These health-style cereals account for a major part of market growth, but pre-sweetened cereals are also one of the fastest growing segments of the cereal category.

Transportation is a major cost factor in the production and distribution of breakfast cereal because both the raw materials and finished product are bulky.

Market Potential

Although Kellogg's Canada is the largest producer of breakfast

cereals in Canada, controlling close to 47 per cent of the market, there's still room for the manufacture of specialty cereals to supply niche markets. One niche market is consumers wanting healthier products.

The Investment Opportunity

To manufacture specialty cereal products targeting niche markets or to relocate and expand production of the facilities of existing companies.

Why choose Alberta?

- Alberta grows some of the finest cereal grains in the world, including organic grains.
- Alberta has preferential freight rates to the United States west coast and midwest.
- There's no local competition (no ready-to-eat cereal plants in the province).
- Alberta has good, inexpensive transportation to western markets.
- Major retail buyers are located in Calgary.

Capital Requirements

- to establish a plant that uses extrusion technology to process cereals, including oats:

\$4 - \$6 million

At the moment, small-scale plants with low capital requirements are not feasible.

Prepared Salads

Prepared salads include potato, coleslaw, pasta, meat, vegetable and fruit salads.

Market Situation and Trends

About one-third of all deli sales in Alberta, worth \$7 million per year, are prepared salads. Most of Alberta's prepared salads come from British Columbia, Manitoba and the Pacific west coast of the United States.

The number of outlets of both in-store and stand-alone delis is increasing, although in-store delis now dominate the market.

Prepared salads are popular items in fast food restaurants.

Market Potential

Projections based on deli-counter sales in major retail outlets indicate a market potential of \$25 to \$30 million over the next five years.

Various buyers for major retail stores suggest they would buy from local suppliers operating out of a federally approved plant, if the suppliers' prices and quality were competitive.

Established meat and pasta processing facilities could expand to accommodate a salad preparation component.

A successful operation should offer a full range of meat, pasta, vegetable and fruit salads, although the facility can build up to the complete complement, adding chilled salads last because of the expense required in their preparation.

The Investment Opportunity

To manufacture and distribute prepared salads.

Why choose Alberta?

- There's large market potential.

Capital Requirements

- to build and equip a 4,000 square foot, stand-alone, vegetable and deli-salad processing facility, without using either meat or pasta:
\$500,000
- with the addition of modified atmosphere packaging equipment (to increase product shelf-life to 30 days):
\$700,000

Soups and Soup Bases

Nutritious and convenient, packaged soup comes in frozen, canned or dried forms. It can be used as a meal-in-itself, snack, appetizer or ingredient in sauces, stuffings or dips.

Market Situation and Trends

In 1993, soup sales in the United States exceeded \$3 billion, in Canada, \$380 million. Canned soups represented two-thirds of the market, with dried capturing the remaining third. Sales of oriental noodle and instant lunch types grew by seven per cent, while canned soup sales declined. Frozen soups, and those packaged for the microwave, are now gaining market share.

The large, well-established soup manufacturing companies currently produce premium lines of refrigerated, freeze-dried, frozen and condensed soup bases for the retail and food service sectors. High-quality, dried soups imported from Europe still sell well at retail outlets and to food services.

To capitalize on consumer desire for hearty, home-style or exotic tastes, restaurants use soup mixes, or canned or frozen concentrates as bases for

preparing a wide variety of house specialty soups.

Market Potential

Soup has become a popular fast food item in restaurants and other retail outlets such as gas bars, convenience stores and grocery mega-stores. Therefore, demand has increased for a greater supply of easy-to-prepare soup bases. A local supplier can offer a premium quality product with an exceptional level of service, particularly to the food services sector.

Alberta also offers niche market opportunities in catering to consumer tastes for premium, gourmet soup varieties, as well as to special dietary needs.

The Investment Opportunity

To supply the retail and food service sectors with high-quality soup bases manufactured in Alberta from local, raw materials.

Why choose Alberta?

- There's no provincial soup-base manufacturer.
- Raw materials are in abundant supply.
- Niche market opportunities exist.

Capital Requirements

- to establish a dried soup blending and packaging facility, depending on capacity and packaging equipment:

\$200,000 - \$500,000

Frozen soup production costs more because freezing capacity is required.

Mustard

Alberta grows yellow, brown and oriental varieties of mustard seed. Yellow is the dominant variety. Mustard is used as an ingredient in condiments, such as salad dressings and ketchup, as a meat extender, and as a water binder in sausage and other meat casings.

Generally, mustard is not manufactured in a stand-alone facility, but as one product in a production facility producing a similar product range. This arrangement allows a company to take full advantage of distribution channels and the production capacity of the plant.

Market Situation and Trends

Mustard seed production more than doubled in both acreage and tonnage from 1992 to 1993. Most is exported to the United States and Western Europe, and is processed into prepared mustard and mustard flour.

The United States market for mustard, worth \$500 million, is 10 times that of Canada's. Regular mustard accounts for about 80 per cent of the market, is very price-competitive and has a low profit margin. Higher-priced, specialty, or gourmet mustard sales are worth about \$6 million in Canada and

are growing at 13 per cent annually. Canadians, influenced by their European heritage, tend to eat more specialty mustard, while United States consume more regular mustard, particularly at sporting events.

Market Potential

Along with a small cottage industry of producers of sweet or honey mustard, the specialty Dijon-type mustard represents a young and growing, as well as a higher profit margin market. Although this market is growing in western North America, a specialty manufacturer should be prepared to produce for export to maximize production capacity.

The Investment Opportunity

To locate a mustard processing plant in Alberta capable of serving western Canadian and United States markets.

Why choose Alberta?

- Mustard seed production is growing.
- Transportation costs to distribute to western North America, the United States midwest and Pacific Rim markets are low.

Capital Requirements

- processing and packaging equipment for a plant with a production capacity of 150 kilograms per hour, or slightly more for specialty mustard:

\$300,000 - \$400,000

Vinegar

Vinegar is produced from grain alcohol.

Market Situation and Trends

Canadian per capita consumption of seven per cent strength vinegar is about three litres per year and includes retail, institutional and industrial markets. In Western Canada, market division is: Alberta, 40 per cent; British Columbia, 30 per cent, Saskatchewan and Manitoba, each 15 per cent. Alberta's market is currently supplied by Ontario and Saskatchewan, or by bulk vinegar from the United States, bottled in Vancouver.

Market Potential

A production plant located in Alberta could supply the entire Alberta market, as well as half of British Columbia's. At this rate, the plant would have to produce 11 million litres of vinegar a year, of which eight million litres would be for the retail market. Cost advantages would allow the plant to compete effectively in Western Canada and northwestern United States.

Because Saskatchewan has a vinegar plant, a substantial marketing effort would be needed to penetrate the

Saskatchewan and Manitoba markets.

The Investment Opportunity

To establish a vinegar production plant in Alberta.

Why choose Alberta?

- Three distilleries in Alberta supply grain alcohol.
- An Alberta producer would have freight advantages over its competitors in the Alberta and British Columbia markets.
- Back-haul rates are favorable.
- Alberta has very low utility costs.

Capital Requirements

- to establish a stand-alone facility with the capacity to produce eight million litres of five per cent vinegar per year, using new submerged fermentation technology and packed tower scrubbers to eliminate fermentation odors:

\$1.6 million

Condiments and Sauces

Condiments and sauces include a wide array of products including salad dressings, meat and poultry sauces, dips, syrups and dessert toppings, and beverage mixes. The largest product group in this category is mayonnaise and salad dressings, followed by peanut butter, pickles, salsa and ketchup.

Market Situation and Trends

Annual sales for Canadian markets of condiments and sauces are more than \$1 billion, of which Western Canada accounts for about one-third. In addition to the domestic market, a large market for specific items exists on the west coast of the United States.

Market Potential

At present, many of the condiments and sauces used in the Western Canadian retail and food services sectors are imported from Eastern Canada and the United States. However, food services often prefer to purchase locally, particularly when the local processor offers consistent and improved product delivery.

Markets exist for custom-manufactured and packaged products in the food services sector, and for ethnic

condiments and sauces in the retail area.

The Investment Opportunity

To produce salad dressings and related products for both retail and food service markets.

Why choose Alberta?

- All necessary raw materials are readily available.
- The Food Processing Development Centre is available to help develop new products.
- Alberta is the distribution centre for Western Canada.

Capital Requirements

- To set up a facility capable of manufacturing a range of condiment products:
\$1.5 million

To minimize storage facility costs, products should be formulated as shelf-stable rather than refrigerated. Hot-packing products also increases shelf-life, but the steam-generating capability will raise capital costs.

Potato Products

Market Situation and Trends

Today's markets for potato products are expanding as consumer and retailer alike recognize the potato's versatility and the convenience of its processed products.

Potatoes are one of Canada's most successful field crops. Alberta grows almost 20,000 irrigated acres of potatoes a year and has potential to significantly increase that amount. Half of the 300,000 tonnes produced are grown for processing. Most frozen potato products are french fries and hash browns, marketed either through the retail or food service sectors. However, only some french fries are locally processed; most used in the food services industry are imported.

More potato products are being designed for microwave preparation to respond to consumer demand for preparation convenience. The convenience of french fry preparation specifically appeals to the retail and hotel, restaurant and institutional industries.

Market Potential

Good market potential exists for potato products in the United

States and in Pacific Rim countries that currently import 800 million frozen, raw potato products each year.

While most potatoes grown in Alberta are processed into french fries and hash browns, the production of other value-added potato products offers excellent potential. Croquettes, potatoes parisienne, battered and seasoned, or simple peeled potatoes are convenience foods that can be prepared in a microwave. They are equally well-suited to the food services and retail trade.

The Investment Opportunity

To establish a potato processing facility in Alberta.

Why choose Alberta?

- Alberta can supply a steady, high-quality, cost-efficient supply of processing potatoes.
- Transportation costs for raw material would be minimal, due to the abundance of local potato supplies.
- Alberta has good distribution access to the United States and Pacific markets.

Capital Requirements

- to establish a potato processing facility, depending on capacity and degree of automation:

***\$4 million to \$50
or \$60 million***

To compete effectively in export markets, a plant must control cost and quality through a high degree of automation. The waste product – 45 per cent of the potato – must be disposed of in an environmentally acceptable manner.

Greenhouse Products

Market Situation and Trends

Every year, fresh vegetable consumption increases in Canada, as do vegetable imports. However, while imports of tomatoes, lettuce, spinach, cabbage, carrots and mushrooms have increased dramatically, imports of radishes and cucumbers have declined. This may be due to new greenhouse developments.

Today, greenhouse crops are identified as such in the marketplace and command a higher market price than field grown varieties.

Recognizing potential, 50 growers in Medicine Hat, Alberta, have devoted 40 acres to producing English cucumbers to supply the Alberta market, as well as markets in Saskatchewan, Manitoba, Nova Scotia, Massachusetts, and Los Angeles. Although Alberta's greenhouse industry is concentrated in the south, it also supports some greenhouses in the Edmonton and Calgary market areas.

Most of Alberta's greenhouses are small, family-run operations, in contrast to British Columbia's, which are large corporate entities. Alberta, further differentiated by its

severe climate, produces no local products from mid-November to early March.

At the moment, most lettuce and tomatoes sold are either field grown and imported from British Columbia or the United States, or greenhouse grown and shipped from British Columbia or Ontario.

Market Potential

Greenhouse produced, locally grown vegetables, can compete some of the year with imports.

The Investment Opportunities

To introduce herb and lettuce production to complement the recent expansion of sprout and spinach greenhouse production.

To establish greenhouse production of small fruit, such as Saskatoon berries, for jams, jellies and syrups.

Capital Requirements

- costs range from:
\$250,000 to \$5 million

Greenhouse products are highly perishable and should be packaged to extend shelf life. Incorporating modified atmosphere packaging equipment to extend shelf life increases capital costs by \$200,000.

Pharmaceutical Products

Market Situation and Trends

World sales in pharmaceuticals exceed \$115 billion. North America's market share is approximately 30 per cent, with Canadian sales estimated at \$4 billion.

Companies in this industry tend to be very large. New drug development costs are expected to continue to rise and further industry consolidation is expected. Although profits in the pharmaceutical industry look attractive, discovery research incurs a substantial level of financial risk that only larger companies can undertake.

These companies, responding to new demands, now also depend more for some of their products on specialist producers engaged in the intermediate stages of manufacturing pharmaceuticals. Thus, the complex processes involved in the manufacture of modern drugs that require complicated and sometimes hazardous reactions are carried out by a manufacturer who specializes in intermediate pharmaceutical production.

Market Potential

Alberta has the potential to provide a variety of raw materials to manufacture

intermediate pharmaceuticals. Manufacturing of plant-based raw materials will proceed profitably if specific crops can be identified as suitable for processing. Alberta is also a good location to produce animal-based intermediate pharmaceuticals cost effectively because meat by-products are continually available from the province's \$2.5 billion meat-processing industry.

Another growing market is for technologies that improve organic chemical processes. Research in biotechnology is essential if the pharmaceutical industry is to keep up with the increasingly complex chemistry required to develop today's new generation of drugs.

The Investment Opportunity

To establish operations capable of the intermediate and final synthesis of pharmaceutical products.

Why choose Alberta?

- Alberta can become a quality, secure and cost-effective source of pharmaceutical raw materials and intermediates.
- At present, a variety of specialty chemical manufacturers capable of intermediate and final

synthesis of pharmaceuticals operate in Alberta. These companies, along with world class research facilities at the Alberta Research Council and university hospitals, are definite assets to establishing a successful, long-term pharmaceutical industry in the province.

Biotechnology and Fermentation

Biotechnology is a collection of technologies that use living systems, or compounds derived from these systems, to produce industrial goods and services.

Fermentation is a sub-sector of biotechnology. The fermentation process creates a range of products that are manufactured and used in pharmaceutical, agricultural (bio-pesticides) and food-processing (enzymes) industries. Fermentation operations depend on a relatively sophisticated level of technological and managerial competence. Initially capital intensive, to be successful fermentation operations also require on-going funds for research and development.

Market Situation and Trends

Enzymes produced by fermentation comprise a substantial portion of the industry's sales.

The biotechnology sector in Canada is still relatively undeveloped. Worldwide, the industry is at an early stage of development and will remain research intensive for at least the next decade.

Market Potential

Product sales have just begun to outstrip the biotechnology industry's research and development spending. This presents Canada with an excellent opportunity to enter the market with new products and processes. Challenging and replacing traditional approaches to bioprocessing with improved biotechnologies will give Canada a competitive edge in the world market.

Enzyme markets are expanding as newer and more effective enzymes are developed. Therefore, commercial ventures to produce micro-biological enzymes should be viable. As most enzymes will be exported, producing low-volume, high-value products will help reduce any cost disadvantage as a result of transporting products to foreign markets. Certain enzymes currently being developed may find local markets sufficient to produce economies of scale.

The Investment Opportunity

To establish a facility to produce enzymes.

Why choose Alberta?

- A reasonably priced, stable supply of substrate is readily available.
- Alberta's work force can supply competent technical and managerial labor.
- The Alberta Research Council's (ARC) fermentation facilities are available to the local fermentation industry. One of the best facilities in North America, it provides a variety of services, including process development.

Capital Requirements

- a new facility:
\$50 - \$200 million

Non-Food Uses for Agricultural Products

The value of the food and beverage industry in Alberta could be increased by developing and using more agriculturally based products with industrial applications.

There are some technical, economic and political constraints preventing the widespread use of agricultural raw materials for industrial uses. However, agricultural raw materials may become more widely used as they become less expensive, and environmental concerns increase. Natural products, for example, biodegradable and less harmful to the environment, may soon replace many of their synthetic counterparts.

Only a few possibilities for industrial use of agricultural products that have potential for commercialization are discussed here.

Native Starches

Native starches are starches derived from maize, wheat, potato or rice, that have not been chemically modified.

They are treated to produce:

- degradation products used in the paper and board industries

- derivatives, including starch esters and ethers
- hydrolysis products, specifically maltodextrins, glucose syrups and various sugars and alcohols, such as dextrose, sorbitol, fructose syrup, levulose and mannitol. (The dextrose and sucrose industries compete as substrates for the fermentation industry)

Sugar

In Alberta, sugar is produced from sugar beets grown on irrigated land.

The sucrose derived from this sugar is used in detergents and polymers. Sucrose esters, exceptionally mild and fully biodegradable, are based on naturally derived sucrose, fats and oils. Sucrose ester surfactants are widely used in Japan in food, personal care and industrial products, although as yet they are little used in Europe or North America.

Glucose, also derived from sugar and found in sugar plants, cereals, wood and in the effluent and other residues of the agricultural and food industries, is a main ingredient in the production of organic and amino acids, penicillin, plastics,

xanthum gum, pharmaceuticals, gums and thickeners, surfactants, enzymes, protein and insecticides.

Dairy By-Products

Today's technology presents great scope to develop a wide range of new products based on dairy by-products. Some by-products and their current uses are readily available from the dairy industry in Alberta.

Lactose, recovered from cheese whey permeate, can be used in ethanol manufacture and microbial polysaccharide synthesis. Converted, it can be used in biodegradable and photodegradable polymers, and processed, in polyurethane foams.

The lactic acid derived from milk is used:

- as a preservative in processed meats, seafoods, mayonnaise and salad dressings
- as a raw material for emulsifiers used in bakery products, fillings and toppings
- as a flavor enhancer in soft drinks, margarine, jams, jellies, wine and beer
- for intravenous and dialysis solutions in the pharmaceutical industry

World demand for lactic acid is growing annually at about four per cent. Canada and the United States import most of their lactic acid and are ready markets for lactic acid that could be produced locally in quantity.

Lactulose is a natural source laxative based on the milk sugar, lactose.

Casein and caseinate, also dairy derivatives, are used in food products and in industrial applications. Their use has shifted in the last 20 years from non-food to food use. A longtime ingredient of glues, sizing, paints, rubber products, plastics, animal feeds and pet foods, casein is now often found in baked goods, cheese products, coffee creamers, pasta, whipped toppings, extruded snack foods, confectionery, meat products and pharmaceutical preparations.

Industrial Oil Crops

New technologies and greater emphasis on biodegradability are encouraging rapid growth of lipid markets. Demand for lipids in the United States market is growing at almost three per cent annually, and sales are expected to be worth \$7.7 billion by 1997. Industrial markets for lipids

include the detergent, paint, lubricating oil, plastic, pharmaceutical and cosmetic industries.

Many, if not most of the above materials are imported, not only into Alberta, but also into the rest of Canada. The successful production of vegetable oil crops in Alberta provides an excellent opportunity to process them for value-added products.

Vegetable Oils

The high erucic-acid oils derived from vegetable oil crops compete for markets with fossil fuel-based oils. Their use is increasing because they are biodegradable and are considered environmentally friendly. They are used as formulated lubricants, lubricants in continuous steel casting and in the manufacture of rubber additives. New product development is the key to increasing the industrial uses of high erucic acid.

Splitting natural fats and oils produces fatty acids and the by-product, glycerin. Glycerin is now often used to replace alcohol as an ingredient in mouthwashes, personal care and other items. As this trend

continues, the use of glycerin is expected to increase.

Industrial Enzymes

The industrial enzymes industry represents a \$700 million share of the \$3.4 billion detergents market. More effective enzymes are replacing traditional cleaners in automatic dishwashing and other detergents because they can effectively and safely replace the commonly used phosphates and chlorine bleaches that are harmful to the environment.

Cosmetic Chemicals

As the trend toward the use of natural ingredients in cosmetics continues to expand, so does the market potential for esters derived from vegetable oils. Mineral oils and animal-derived products are being replaced by products based on vegetable oils and starch. Demand for plant-based ingredients in personal care products, for example, should increase demand for wheat germ oils and wheat proteins.

Cereal Straw

Awareness is growing of the value of cereal straw for the production of pulp for paper, structural panels, edible fibre, composite fireplace logs and

other uses. Cereal straw is inexpensive to produce; it is also readily available. Because cereal straw is an annually renewable resource, supplies will always be plentiful. Farming operations can increase their income by increasing their straw crop. This should encourage sufficient crop production to meet new demands. As availability of wood for paper production diminishes, cereal straw and other sources of fibre are being investigated as viable substitutes.

To produce new products from cereal straw, investment in new processing technology is needed.

Capital investment costs vary. For example, to set up a composite fireplace log plant, investment can be as low as \$150,000. However, to produce a specialty grade of straw pulp would require a minimum of \$1 million.



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